

**What is Claimed is:**

1. A method for fabricating a MTJ cell of a MRAM, comprising the steps of:

5 forming a pinned ferromagnetic layer on a connection layer;

forming a tunnel barrier layer on the pinned ferromagnetic layer by depositing a semiconductor film; and

10 forming a free ferromagnetic layer on the tunnel barrier layer.

2. The method according to claim 1, wherein the semiconductor film consists of a pure Group IV element.

15 3. The method according to claim 1, wherein the semiconductor film consists of a Group IV element and includes a Group III element or a Group V element as an impurity.

20 4. The method according to claim 1, wherein the semiconductor film is a compound semiconductor film consisting of a Group III element and a Group V element.